

Tampa Bay Seawater Desalination Plant (tampabaywater.org)

The Tampa Bay Seawater Desalination facility is a drought-proof, alternative water supply that provides up to 25 million gallons per day of drinking water to the region. Seawater coming into the plant goes through a rigorous pretreatment process then freshwater is separated from the seawater using reverse osmosis. The end product is high-quality drinking water that supplies up to 10 percent of the region's needs.

How the Plant Works

The Tampa Bay Seawater Desalination Plant uses a process called reverse osmosis (RO) to produce drinking water from seawater.

The desalination plant is located next to Tampa Electric's (TECO) Big Bend Power Station, which already withdraws and discharges up to 1.4 billion gallons a day of seawater from Tampa Bay, using it as cooling water for the power plant. The Tampa Bay Seawater Desalination plant "catches" up to 44 million gallons per day (mgd) of that warm seawater, separates it into drinking water and concentrated seawater and dilutes the twice-as-salty seawater before returning it to the bay.

Pretreatment

Before the RO process, seawater entering the desalination plant flows through screens that remove debris, then goes through a traditional treatment process called coagulation and flocculation. In this process, chemicals are added to the seawater to make algae, organic materials and particles clump together so they can be removed more easily in the sand filtration stage.

After sand filtration, the salty water goes through diatomaceous earth filters to remove silt and fine particles. Cartridge filters just before the RO membranes serve as a backstop, removing any particles that may be remaining after the diatomaceous earth filters.

Reverse Osmosis

Next is the RO process. High pressure forces the pretreated water through semi-permeable membranes to separate the freshwater, leaving twice-as-salty seawater and other minerals behind.

The size of each RO membrane pore is about .001 microns, which is about 1/100,000th the diameter of a human hair.

Post-treatment, Blending and Delivery

After the RO process, chemicals are added to stabilize the desalinated seawater. The high-quality water is delivered to Tampa Bay Water's regional facilities site where it is blended with treated drinking water from other supply sources before being delivered to Tampa Bay Water's members.

Concentrate Return

At full capacity, the RO process leaves about 19 mgd of twice-as-salty seawater behind which is returned to Big Bend's cooling water stream and blended with up to 1.4 billion gallons of cooling water, achieving a blending ratio of up to 70-to-1. At this point before entering and mixing with any bay water, the salinity is already only 1.0 to 1.5 percent higher, on average, than water from Tampa Bay. This slight increase falls within Tampa Bay's normal, seasonal fluctuations in salinity.

The cooling water mixture moves through a discharge canal, blending with more seawater, diluting the discharge even further. By the time the discharged water reaches Tampa

Bay, its salinity is nearly the same as the Bay's. And, the large volume of water that naturally flows in and out of Tampa Bay near Big Bend provides more dilution, preventing any long-term build-up of salinity in the bay.

Tampa Bay Water's comprehensive hydrobiological monitoring program collects thousands of samples including continuous salinity measurements every 15 minutes near the desalination facility. This and other water quality monitoring since 2003 shows no measurable salinity changes in Tampa Bay related to plant production.

